

WHAT IS CLAIMED IS:

1. A non-human eukaryotic organism having a genome comprising a first exogene being in a first chromosome of a chromosome pair of said genome and a second exogene being in a second chromosome of said chromosome pair, said first and said second exogenes being in allelic relationship, such that said first and said second exogenes obligatorily segregate to different gametes.

2. The organism of claim 1, wherein expression of said first and said second exogenes determines a phenotype of the organism.

3. The organism of claim 1, wherein an expression product of said second exogene transactivates expression of said first exogene.

4. The organism of claim 1, wherein said second exogene encodes an RNA polymerase.

5. The organism of claim 1, wherein said second exogene encodes a transcription factor.
6. The organism of claim 1, wherein said first exogene encodes a polypeptide selected from the group consisting of a cytotoxic polypeptide and a cytostatic polypeptide.
7. The organism of claim 1, wherein said first exogene encodes an RNA molecule selected from the group consisting of an antisense RNA molecule and a ribozyme RNA molecule.
8. The organism of claim 1, wherein expression products of said first and said second exogenes assemble into a hetero-oligomeric protein.
9. The organism of claim 8, wherein said hetero-oligomeric protein has an activity selected from the group consisting of cytotoxic activity and cytostatic activity.

10. The organism of claim 1, wherein the organism is a plant species.

11. The organism of claim 10, wherein said second exogene encodes an RNA polymerase non-operable with eukaryotic promoters.

12. The organism of claim 11, wherein said RNA polymerase is selected from the group consisting of bacterial RNA polymerase and bacteriophage RNA polymerase.

13. The organism of claim 11, wherein said bacteriophage RNA polymerase is selected from the group consisting of T7 RNA polymerase, T3 RNA polymerase and SP6 RNA polymerase.

14. The organism of claim 11, wherein said first exogene encodes a polypeptide selected from the group consisting of a cytotoxic polypeptide and a cytostatic polypeptide.

15. The organism of claim 14, wherein said polypeptide is selected from the group consisting of pectate lyase, 1-3 β -glucanase, avidin, streptavidin, diphtheria Toxin A-chain (DTA), URF13, Indole acetic acid-lysine synthetase, CytA toxin and RNase-TI.

16. The organism of claim 11, wherein said second exogene is under control of a eukaryotic tissue specific promoter, such that said first exogene is expressed in a specific tissue of said plant species.

17. The organism of claim 16, wherein said specific tissue forms a part of an stamen tissue of said plant.

18. The organism of claim 17, wherein expression of said first exogene and said second exogene results in male sterility of said plant.

19. An expression cassette comprising:

- (a) a first segment including a first promoter sequence;
- (b) a second segment including a first transcribable polynucleotide sequence; and

- (c) a third segment including a second transcribable polynucleotide sequence, said second transcribable polynucleotide sequence being operatively linked to a second promoter sequence, said third segment being flanked by said first and second segments, wherein a pair of site-specific recombination sequences are disposed one between said first segment and said third segment and another between said second segment and said third segment, such that said first promoter sequence is operatively coupled with said first transcribable polynucleotide sequence only following excision of said third segment from the expression cassette by site specific recombination via said pair of site-specific recombination sequences.

20. The expression cassette of claim 19, wherein said first promoter sequence is a non-eukaryotic promoter sequence.

21. The expression cassette of claim 19, wherein said second promoter sequence is a tissue specific promoter sequence naturally operable in a first tissue.

22. The expression cassette of claim 21, wherein said first promoter sequence is a tissue specific promoter sequence naturally operable in a second tissue and further wherein said second transcribable polynucleotide sequence encodes a tissue specific transcription activator naturally expressed in said second tissue and naturally capable of activating said first promoter sequence.

23. The expression cassette of claim 19, wherein said pair of site-specific recombination sequences are selected from the group consisting of Lox recombination sequences, FRT recombination sequences, Gin recombinase sequences, Pin recombinase sequences and R/RS recombinase sequences.

24. The expression cassette of claim 19, wherein said second transcribable polynucleotide sequence encodes a transactivator.

25. The expression cassette of claim 24, wherein said transactivator is an RNA polymerase.

26. The expression cassette of claim 19, wherein said first polynucleotide sequence an enzyme.

27. The expression cassette of claim 19, wherein said first transcribable polynucleotide sequence encodes an RNA molecule selected from the group consisting of an antisense RNA molecule and a ribozyme RNA molecule.

28. The expression cassette of claim 19, wherein said second polynucleotide sequence encodes a transactivator of said first promoter sequence.

29. The expression cassette of claim 19, wherein said first transcribable polynucleotide sequence encodes a transactivator.

30. The expression cassette of claim 24, wherein said transactivator is an RNA polymerase.

31. The expression cassette of claim 19, wherein said second polynucleotide sequence encodes an enzyme.

32. The expression cassette of claim 19, wherein said second transcribable polynucleotide sequence encodes an RNA molecule selected from the group consisting of an antisense RNA molecule and a ribozyme RNA molecule.

33. The expression cassette of claim 19, wherein said first transcribable polynucleotide sequence encodes a transactivator of said second promoter sequence.

34. The expression cassette of claim 19, wherein said first promoter sequence is a tissue specific promoter sequence naturally operable in a first tissue.

35. The expression cassette of claim 21, wherein said second promoter sequence is a tissue specific promoter sequence naturally operable in a second tissue and further wherein said first transcribable polynucleotide sequence encodes a tissue specific transcription activator naturally expressed in said second tissue and naturally capable of activating said second promoter sequence.

36. An expression cassette comprising:

- (a) a first segment including a first transcribable polynucleotide sequence, said first transcribable polynucleotide sequence being operatively linked to a first promoter sequence, said first segment being flanked by a pair of first site-specific recombination sequences; and
- (b) a second segment, being linked to said first segment, said second segment including a second transcribable polynucleotide sequence, said second transcribable polynucleotide sequence being operatively linked to a second promoter sequence, said second segment being

flanked by a pair of second site-specific recombination sequences.

37. The expression cassette of claim 36, wherein said first and said second pair of directly repeated site-specific recombination sequences are each independently selected the group consisting of Lox recombination sequences, FRT recombination sequences, Gin recombinase sequences, Pin recombinase sequences and R/RS recombinase sequences.

38. The expression cassette of claim 36, wherein said first promoter sequence is a non-eukaryotic promoter sequence.

39. The expression cassette of claim 36, wherein said second promoter sequence is a tissue specific promoter sequence naturally operable in a first tissue.

40. The expression cassette of claim 39, wherein said first promoter sequence is a tissue specific promoter sequence naturally

operable in a second tissue and further wherein said second transcribable polynucleotide sequence encodes a tissue specific transcription activator naturally expressed in said second tissue and naturally capable of activating said first promoter sequence.

41. The expression cassette of claim 36, wherein said second transcribable polynucleotide sequence encodes a transactivator.

42. The expression cassette of claim 41, wherein said transactivator is an RNA polymerase.

43. The expression cassette of claim 36, wherein said first transcribable polynucleotide sequence encodes an enzyme.

44. The expression cassette of claim 36, wherein said first transcribable polynucleotide sequence encodes an RNA molecule selected from the group consisting of an antisense RNA molecule and a ribozyme RNA molecule.

45. The expression cassette of claim 36, wherein said second transcribable polynucleotide sequence encodes a transactivator of said first promoter sequence.

46. A method of generating exogenic allelism in a non-human eukaryotic organism, the method comprising the steps of:

- (a) generating a first and a second isogenic organisms homozygous for the expression cassette of claim 19
- (b) introducing a recombinase into said first organism, so as to excise said third segment thereby operatively adjoining said first transcribable polynucleotide sequence to said first promoter sequence; and
- (c) crossing said organism resultant from step (b) and said second organism, so as to generate an offspring characterized by exogenic allelism.

Sub 27 47. The method of claim 46, wherein the non-human eukaryotic organism is a plant species and further wherein said first and said second transcribable polynucleotide sequences are selected such that said offspring is male sterile and female fertile.

(a) generating a first and second isogenic organisms homozygous for the expression cassette of claim 36;

(b) introducing a first recombinase into said first organism, so as to excise said first segment;

(c) introducing a second recombinase into said second organism, so as to excise said second segment; and

(d) crossing said organisms resultant from steps (b) and (c), so as to generate an offspring characterized by exogenic allelism.

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37 49. The method of claim 48, wherein the non-human eukaryotic organism is a plant species, and further wherein said first and said second transcribable polynucleotide sequences are selected such that said offspring is male sterile and female fertile.

50. A plant homozygous for the expression cassette of claim

51. A plant homozygous for the expression cassette of claim

36.

52. A plant comprising a genome, said genome including a pair of exogenes being in allelic relationship, wherein a first exogene of said pair of exogenes being located on a first chromosome of a chromosome pair of said genome of the plant, and further wherein a second exogene of said pair of exogenes being located on a second chromosome of said chromosome pair of said genome of the plant.

53. The plant of claim 52, wherein said first and second exogenes are selected such that expression thereof generates male sterile plant.

54. The plant of claim 53, wherein by crossing said male sterile plant with a male fertile plant results in offsprings characterized by male fertility.

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